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New Hurricane-Strength Scale Could Send Earlier Warnings

Tim Reinhold of the Insurance Institute for Business & Home Safety wasn't satisfied that the way we measure hurricanes truly matches up to their power, or danger. So he teamed with Mark Powell of the National Oceanic and Atmospheric Administration to create a new hurricane rating scale, the IKE (integrated kinetic energy), which could prove to be quicker than current scales for warning people and planning evacuations. Reinhold, who now holds a patent for the scale, tells PM how it works.

BY SKYLAR BERGL

Hurricane Katrina

NASA

Q Why replace the old Saffir-Simpson scale with an entirely new one?

A A number of us have been watching the big storms that have come through in the past 10 or more years, looking at both the surge and the wind levels. Then [we looked] at... popular expectations based on the Saffir-Simpson scale, and realized there was a real disconnect [with the] expanded Saffir-Simpson scale (originally it was just wind speed; they added storm surge in there as well).

Look at an event like Ivan—which would be one that hit in the Pensacola area and had a huge amount of surge—or even Opal before that. When those storms hit, the winds weren't terribly high, but they had a tremendous amount of surge with them. Then you come to Katrina, Rita and Ike. When you look at what the storm was at least at landfall, Katrina was a Category 3 from a wind standpoint, but the surge was easily Category 5.

There was a lot of pressure coming on the hurricane center even back after Ivan to have categorized it as a Category 4 because of the surge. [But] the highest winds we could find anywhere, and we had instruments throughout the whole area measuring stuff as the storm came in—were a small area of Category 2 type winds, and most of the area around Pensacola actually saw Category 1 winds.

Tell us how your scale, the IKE, works. It's a little like the way seismologists measure the energy released in an earthquake, right?

Q

A The magnitude scale from [earthquakes] is based on energy, so this is sort of an analog to that. We're looking at the energy in the storm. Here, what Mark [Powell] has done is take a slice of the storm at 10 meters high and 1 meter deep and calculate the energy within that plane. So when people are running the numerical models, they could calculate that. He's come up with some other ways, based on the radius of tropical storm force and radius of hurricane-force winds, that [these measurements] can also be calculated. There are several different ways to at least get some general estimates of what those numbers are.

Q **Could you explain what the SDP [surge destructive potential] means for a storm?**

A For a storm like Katrina you'd be seeing more in terms of surge. When it was sitting out in the middle of the Gulf as a Category 5 heading for the coast, it was both surge and wind, then the wind started falling apart. But the surge had pretty much been set in motion by that time and the total amount of energy in the storm didn't really drop, although it got spread out over a much broader area and the peak winds dropped down.

So the idea was to try to come up with a different scale that would do a better job of capturing the potential for surge damage [and] the potential for wind damage in a separate kind of way.

Q **Elaborate on the 0-to-5.99 scale that you use to rate hurricanes with IKE.**

A It's trying to give a continuous scale, so hurricanes could be a high 3, or low 4. In the Saffir-Simpson you're either a 3 or a 4. But this scale is like "You're a 4.9 so you're almost to a 5." [We're] trying to give a little bit more differentiation and smoothness to it so that people have a better sense.

Q **What would the scale translate to a storm like Katrina? What would they have been on the IKE scale versus the S-S scale?**

A Katrina, when it was out as a Category 5 in the middle of the Gulf, was a 5 in both scales, I believe. Then as it came into land, the total kinetic energy above tropical storm force kept it (from a surge standpoint according to the IKE scale) as a 5, [even as] the wind part of it began to drop down.

This all boils down to planning, then?

Q

A In the end what people need to focus on is feet of water and knowing what their elevation is. Because by that time you know where [the storm is] going to go, and people can run the models on the setup of the waves and all that's going into creating that surge, so you're going to have a much better estimate of what that surge is going to be—and hopefully the extent of it.

I think the one advantage of the IKE scale is that it gives a little bit earlier warning: "Guys, this is a really big storm and it's got a lot of energy and wherever it comes in, it's going to create a lot of surge because it's such a big storm." Or, "It's a small-footprint storm but very high-intensity winds, so wind is going to be the biggest issue."

Q **How could it affect safety and evacuations?**

A It's trying to give people an earlier warning. Right now there are so many areas of our coast... where the storm could be on you before there's enough time for the people that should be evacuating to evacuate. And so it's trying to put things on people's radar so they don't get caught waiting too long, and they can't get out.

Q **What's next for your research?**

A There's more... that still needs to be done to help with people's perception of how [our system would rate] a Katrina or a Camille or an Andrew, so that they get a better feel for what these numbers really mean. And there's still [unknown] physics between where the storm is right now, where you're looking at these numbers, and what it is going to mean when it actually hits land. So I see it as an early warning.

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